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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/658,687	09/09/2003	Hiroyuki Yoshimura	FUJI:275	2147

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EXAMINER

ARANCIBIA, MAUREEN GRAMAGLIA

ART UNIT	PAPER NUMBER
	1763

DATE MAILED: 10/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

VW

<b>Office Action Summary</b>	Application No.	Applicant(s)
	10/658,687	YOSHIMURA, HIROYUKI
	Examiner Maureen G. Arancibia	Art Unit 1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM  
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 23 August 2004.

2a) This action is **FINAL**.      2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 1-14 is/are pending in the application.

4a) Of the above claim(s) 9-14 is/are withdrawn from consideration.

5) Claim(s) \_\_\_\_\_ is/are allowed.

6) Claim(s) 1-8 is/are rejected.

7) Claim(s) \_\_\_\_\_ is/are objected to.

8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on 09 September 2003 is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All    b) Some \* c) None of:

1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) Notice of References Cited (PTO-892)

2) Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_

4) Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.

5) Notice of Informal Patent Application (PTO-152)

6) Other: \_\_\_\_\_.

## DETAILED ACTION

### ***Election/Restrictions***

1. Applicant's election of the invention of Group 1, Claims 1-8, in the reply filed on 8/23/2004 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).
2. Claims 9-14 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 8/23/2004.

### ***Drawings***

3. Figures 2-7 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.121(d)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,580,639 to Togawa et al. in view of U.S. Patent 6,613,459 to Saito et al., and in light of "Ferrite devices" by Chin (in AccessScience@McGraw-Hill, <http://www.accessscience.com>, DOI 10.1036/1097-8542.254100, last modified: January 28, 2002).

Togawa et al. teaches a method of manufacturing a magnetic medium, comprising: providing a substrate 11 (Column 5, Line 37); forming a SiO<sub>2</sub> layer 13 on the substrate (Column 5, Lines 47-50); etching the SiO<sub>2</sub> layer to form a pattern (Column 6, Lines 39-42; Figure 7); etching the exposed portions of the substrate through the patterned SiO<sub>2</sub> layer to form grooves (Column 6, Lines 57-62; Column 7, Lines 6-7; Figure 8); forming a hard magnetic film on the surface of the oxidized substrate to fill the grooves by using a vacuum film forming apparatus (Column 7, Lines 35-36 and 47-50); and polishing the hard magnetic film to form a smooth surface (Column 8, Lines 8-9).

Figure 11 illustrates that the SiO<sub>2</sub> layer acts as a polishing stop.

Togawa et al. does not teach that the magnetic film can be formed of a soft magnetic material.

Saito et al. teaches that magnetically soft films (i.e. Co-based) can be embedded in the grooves of a master magnetic disc. (See, for example, Column 2, Line 57; Column 7, Lines 7-8)

It would have been obvious to one of ordinary skill in the art to modify the method taught by Togawa et al. to use a magnetically soft film, as taught by Saito et al. The

motivation for doing so would have been to embed magnetic material with a lower magnetic coercivity. (See Chin, first paragraph for an explanation of the properties of magnetically hard and soft materials.)

In regards to Claim 2, Togawa et al. teaches a silicon substrate. (Column 5, Line 37)

In regards to Claim 3, Togawa et al. further teaches the steps of forming a photoresist on the SiO<sub>2</sub> layer, patterning the photoresist by UV exposure through a photomask, and developing the exposed photoresist to form a patterned mask for etching the SiO<sub>2</sub> layer. (Column 6, Lines 4-40)

6. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Togawa et al. and Saito et al. as applied to Claim 3, and further in view of U.S. Patent 5,998,261 to Hofmann et al.

The combination of Togawa et al. and Saito et al. teaches the method of Claim 3, on which Claim 4 depends. Togawa et al. further teaches that the SiO<sub>2</sub> layer should be etched under a gaseous atmosphere, using the photoresist as a mask. (Column 6, Lines 32-53)

The combination of Togawa et al. and Saito et al. does not teach that the gaseous atmosphere should comprise CHF<sub>3</sub> and O<sub>2</sub>.

Hofmann et al. teaches that a SiO<sub>2</sub> layer can be etched under CHF<sub>3</sub> and O<sub>2</sub>. (Column 3, Lines 45-48)

It would have been obvious to one of ordinary skill in the art to modify the method taught by the combination of Togawa et al. and Saito et al. to use an atmosphere of

CHF<sub>3</sub> and O<sub>2</sub> to etch the SiO<sub>2</sub> layer, as taught by Hofmann et al. The motivation for doing so would have been to use a common SiO<sub>2</sub> etchant.

7. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Togawa et al., Saito et al., and Hofmann et al. as applied to Claim 4 above, and further in view of "Etch Rates for Micromachining Processing" by Williams et al. (*Journal of Microelectromechanical Systems*, Vol. 5, No. 4, December, 1996, pages 256-269.) and Saito et al.

The combination of Togawa et al., Saito et al., and Hofmann et al. teaches the limitations of Claim 4, on which Claim 5 depends, including etching the substrate to form grooves.

The combination of Togawa et al., Saito et al., and Hofmann et al., as applied to Claim 4, does not teach that the substrate should be etched under an SF<sub>6</sub> atmosphere, or that the grooves should have a depth of about 0.5 µm.

Williams et al. teaches that SF<sub>6</sub> is a good etchant for silicon. (p. 261, III.A.2; Table II)

Saito et al. discloses a known method of manufacturing a master disk (3), including etching grooves (6) into a silicon substrate (3c) to a depth of 0.5 µm. (Column 2, Lines 46-52)

It would have been obvious to one of ordinary skill in the art to modify the method taught by the combination of Togawa et al., Saito et al., and Hofmann et al. as applied to Claim 4 to etch the silicon substrate with SF<sub>6</sub>, as taught by Williams et al., in order to form grooves with a depth of 0.5 µm, as taught by Saito et al. The motivation for using

SF<sub>6</sub> to etch the Si substrate, as taught by Williams et al. (p. 261, III.A.2), would have been that SF<sub>6</sub> supplies very reactive F atoms. The motivation for etching the grooves to a depth of 0.5  $\mu$ m would have been to provide sufficient depth to embed a magnetic film.

8. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Togawa et al., Hofmann et al., Williams et al., and Saito et al. as applied to Claim 5 above, and further in view of U.S. Patent 5,770,465 to MacDonald et al.

The combination of Togawa et al., Hofmann et al., Williams et al., and Saito et al. teaches the limitations of Claim 5. In addition, Togawa et al. teaches that a magnetic film can be sputtered on the SiO<sub>2</sub> surface, filling the grooves. (Column 7, Lines 40-45; Column 8, Lines 6-9; Figure 10a) Togawa et al. also teaches that the SiO<sub>2</sub> layer can be formed by thermal oxidation. (Column 5, Lines 50-53) The combination of Togawa et al., Hofmann et al., Williams et al., and Saito et al. does not teach that the magnetic film can have a thickness of 1  $\mu$ m, or that the SiO<sub>2</sub> layer can have a thickness of 0.1 to 0.2  $\mu$ m.

MacDonald et al. teaches that a SiO<sub>2</sub> layer with a thickness of 0.2  $\mu$ m can be used as an etch mask for an underlying Si substrate. (Column 10, Lines 29-35)

It would have been obvious to one of ordinary skill in the art to modify the method taught by the combination of Togawa et al., Hofmann et al., Williams et al., and Saito et al. to form the SiO<sub>2</sub> layer with a thickness of 0.2  $\mu$ m, as taught by Macdonald et al. The

motivation for doing so would be to have an effectively etch-resistant mask during the Si etch.

It would further have been obvious to one of ordinary skill in the art to further modify the method taught by the combination of Togawa et al., Hofmann et al., Williams et al., Saito et al., and Macdonald et al. to have the thickness of the sputtered magnetic film be about 1  $\mu\text{m}$ . The grooves to be filled in the method taught by the combination of Togawa et al., Hofmann et al., Williams et al., Saito et al., and Macdonald et al. would be approximately 0.7  $\mu\text{m}$  deep (0.2  $\mu\text{m}$  through the  $\text{SiO}_2$  layer, plus 0.5  $\mu\text{m}$  into the Si substrate). One of ordinary skill in the art would have been motivated to use about 1  $\mu\text{m}$  of magnetic material in order to slightly overfill the grooves, as taught by Togawa et al. (Figure 10a), without excessive waste.

Therefore, the combination of Togawa et al., Hofmann et al., Williams et al., Saito et al., and Macdonald et al. meets the limitations recited in Claims 6 and 7.

9. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Togawa et al. and Saito et al. as applied to Claim 1 above, and further in view of the JPO Machine English Translation of Japanese Publication 11-339242 ("JP '242;" abstract from Applicant's IDS).

The combination of Togawa et al. and Saito et al. teaches all the limitations of Claim 1, on which Claim 8 depends.

The combination of Togawa et al. and Saito et al. does not teach that the grooves can have a width not greater than 0.5  $\mu\text{m}$ .

JP '242 teaches that the grooves of a magnetic recording medium can have a width of 0.3  $\mu\text{m}$ . (Paragraph 13)

It would have been obvious to one of ordinary skill in the art to modify the method taught by the combination of Togawa et al. and Saito et al. to form grooves with a width of 0.3  $\mu\text{m}$  (i.e. less than 0.5  $\mu\text{m}$ ). The motivation for making the grooves that narrow would have been to increase the recording density.

### ***Conclusion***

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maureen G. Arancibia whose telephone number is (571) 272-1219. The examiner can normally be reached on 10:00-6:30, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (571) 272-1439. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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